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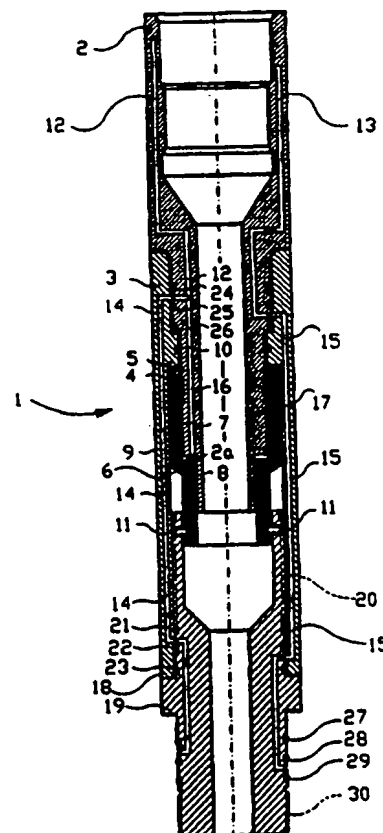
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<p>(21) International Application Number: PCT/NO97/00035</p> <p>(22) International Filing Date: 5 February 1997 (05.02.97)</p> <p>(30) Priority Data: 960540 12 February 1996 (12.02.96) NO</p> <p>(71) Applicant (for all designated States except US): BAKKE OIL TOOL A/S [NO/NO]; Bekkeleia 1, N-4330 Ålgård (NO).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): BAKKE, Stig [NO/NO]; Bekkeleia 1, N-4330 Ålgård (NO).</p> <p>(74) Agents: HÅMSØ, Borge et al.; Håmsø Patentbyrå ans, P.O. Box 171, N-4301 Sandnes (NO).</p>	<p>(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, ES, FI, FI (Utility model), GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i> <i>In English translation (filed in Norwegian).</i></p>	

(54) Title: **HYDRAULICALLY RELEASABLE COUPLING**

(57) Abstract

Hydraulically releasable coupling (1) of the kind arranged to releasably connect a tool to a coiled tube, and which coupling (1) is provided with two or more hydraulic channels (12, 14) and (13, 15), arranged to convey hydraulic fluid from hydraulic lines, arranged in the coiled tube, to the tool; and in which the coupling (1) is held in coupled position by a locking device (4) which is secured by means of an axially displaceable sleeve (6), which again is fixed in locking position by shear pins (11). The sleeve (6) is arranged to work as a sleeve-shaped hydraulic piston, the sleeve (6) being provided with annular seals (7, 8, 9) of different seal diameters, whereby the seals (7, 8, 9) define annular areas, each assigned to a hydraulic channel (12, 14) and (13, 15). The sleeve (6) is subjected to an axially acting force equalling the sum of the products of the pressure in each of the hydraulic channels and the thereto assigned annular area. The shear pins (11) are arranged to break, whenever both annular areas are subjected to hydraulic working pressure.



HYDRAULICALLY RELEASABLE COUPLING

The present invention refers to a hydraulically
releasable coupling, in particular for use together
with equipment which is lowered into an oil or gas
5 well.

When working in an oil or gas well, there is a need for
introducing different tools and other items into the
well. In wells that deviate strongly from the vertical,
the tool is often attached to the end of a coiled tube,
10 which in addition to guiding the tool, also enables
circulation of the fluid in the well.

It may happen that a tool gets stuck in the well, and
special equipment has to be introduced to extract the
tool from the well. Before such equipment can be
15 introduced into the well, the coiled tube must be
disconnected from the stuck tool and withdrawn from the
well. To enable such disconnection of the coiled tube,
it is customary to fit a releasable coupling between
the coiled tube and tool. Couplings of this kind
20 comprise two sleeve-shaped main parts releasably
connected, and secured in coupled position by a

Some of the hydraulic tools require hydraulic control signals in addition to hydraulic power, and it is common to use a coiled tube, prefitted with two internal thin tubes, for the transmission of such hydraulic control signals. In addition the coiled tube often carries an electric cable for the transmission of electric signals to or from the tool. In such cases there is no room for dropping a sealing body through the coiled tube, and known couplings which are released by means of a sealing body, can, therefore, not be used. Thus, couplings released through pull is the only possibility left, as mentioned above.

The object of the invention is to provide a hydraulically releasable coupling, which may be used whenever hydraulic signal lines are being carried in the coiled tube to the tool, which is connected to the coiled tube by the coupling.

The object is achieved through the characteristics given in the description below and the following claims.

As mentioned, it is customary to lead at least two hydraulic signal lines through a coiled tube to hydraulic tools. The signal lines are used in a known manner, as pressure line and return line, alternately, for hydraulic fluid, to allow a hydraulic function to be reversed. Two hydraulic signal lines which alternately act as pressure line and return line, are each, according to the present invention, lead to a hydraulic piston or a defined area of a common hydraulic piston in the hydraulically releasable coupling.

main part 2 is inserted into a second main part 3. The two main parts 2, 3 are held together by a radially resilient and expandable ring 4 provided with internal grooves, which engage complementary external grooves in the main part 2. A ring of this type is known from Norwegian patent application No. 942136. The ring 4 is located in an annular space between the two main parts 2, 3 and below an internal shoulder 5 of the second main part 3. When the grooves of the ring 4 are in engagement with the grooves of the main part 2, it is not possible to separate the two main parts 2, 3 from each other, the ring 4 bearing on the shoulder 5. Said annular space is big enough to accommodate expansion of the ring 4, so that the grooves of the ring 4 disengage the grooves of the main part 2. The main part 2 may then be pulled up and out of the second main part 3.

Inside the main part 3 an axially displaceable sleeve 6 is arranged, whose upper part encloses the ring 4 and prevents it from expanding. The sleeve 6 slides within the main part 3 and externally on main part 2 in the annular space between the two main parts 2,3. The sleeve 6 is provided with an internal stepping 6a at its lower end, and the main part 2 is correspondingly formed with an external stepping 2a. The inner surface of the sleeve 6 thus bears against the main part 2 at two different diameters, and an annular seal 7 is arranged to seal between the sleeve 6 and the main part 2 at the larger diameter, while a seal 8 is arranged to seal between the sleeve 6 and the main part 2 at the smaller diameter. An annular seal 9 is arranged to seal between the sleeve 6 and the main part 3. Further, an annular seal 10 is arranged to seal between the main parts 2, 3 above the ring 4 and the sleeve 6.

The sleeve 6 is kept in position by means of shear pins 11. To release the coupling 1, so that the main parts

The sleeve 6 forms a sleeve-shaped hydraulic piston, in which three annular seals of different seal diameters define two annular areas, the first within the second. To the annular areas are assigned the first hydraulic channel 12, 14 and the second hydraulic channel 13, 15, respectively, of the coupling 1. The sleeve 6 is subjected to an axially acting force which equals the sum of the products of the pressure in each of the two hydraulic channels and the annular area assigned thereto. The shear pins 11 are arranged to break whenever the two annular areas are subjected to hydraulic working pressure.

The annular area and the shear pins 11 are also dimensioned so that the shear pins 11 cannot break from the overall axial force acting on the sleeve 6, by the highest occurring hydraulic working pressure in one of the hydraulic channels 12, 14 or 13, 15, and the simultaneously highest occurring hydraulic return pressure in the other hydraulic channel.

At the same time, the two annular areas, defined by the seals 7 and 8; 7 and 9, respectively, and the shear pins 11, are mutually dimensioned, so as to make the shear pins 11 break from the axial force developed whenever both hydraulic channels are pressurized with full working pressure.

Hydraulically controlled downhole tools may thus be used in an ordinary manner without the coupling releasing. By connecting the two hydraulic lines to a hydraulic pressure source with full working pressure, the shear pins 11 will break, and the coupling 1 will be released, thereby enabling separation of the two main parts 2 and 3.

connection from two hydraulic lines in the coiled tube,
through the channels 12, 13 in the first part 2 of the
coupling 1, through the annular slots between the seals
24, 25, 26 and to the channels 14, 15 and out into the
5 annular slots between the seals 27, 28 and 29 to the
tool.

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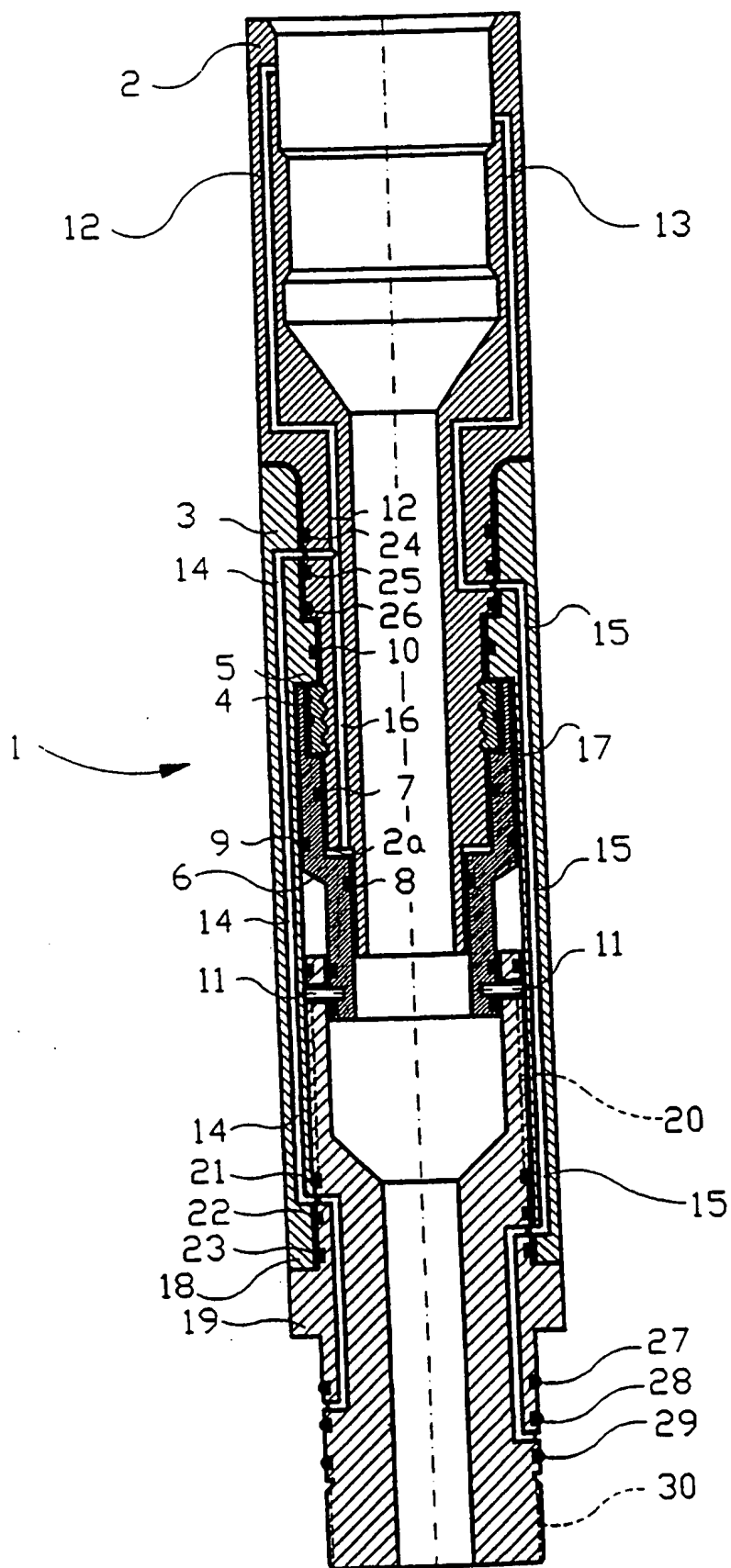


Fig. 1

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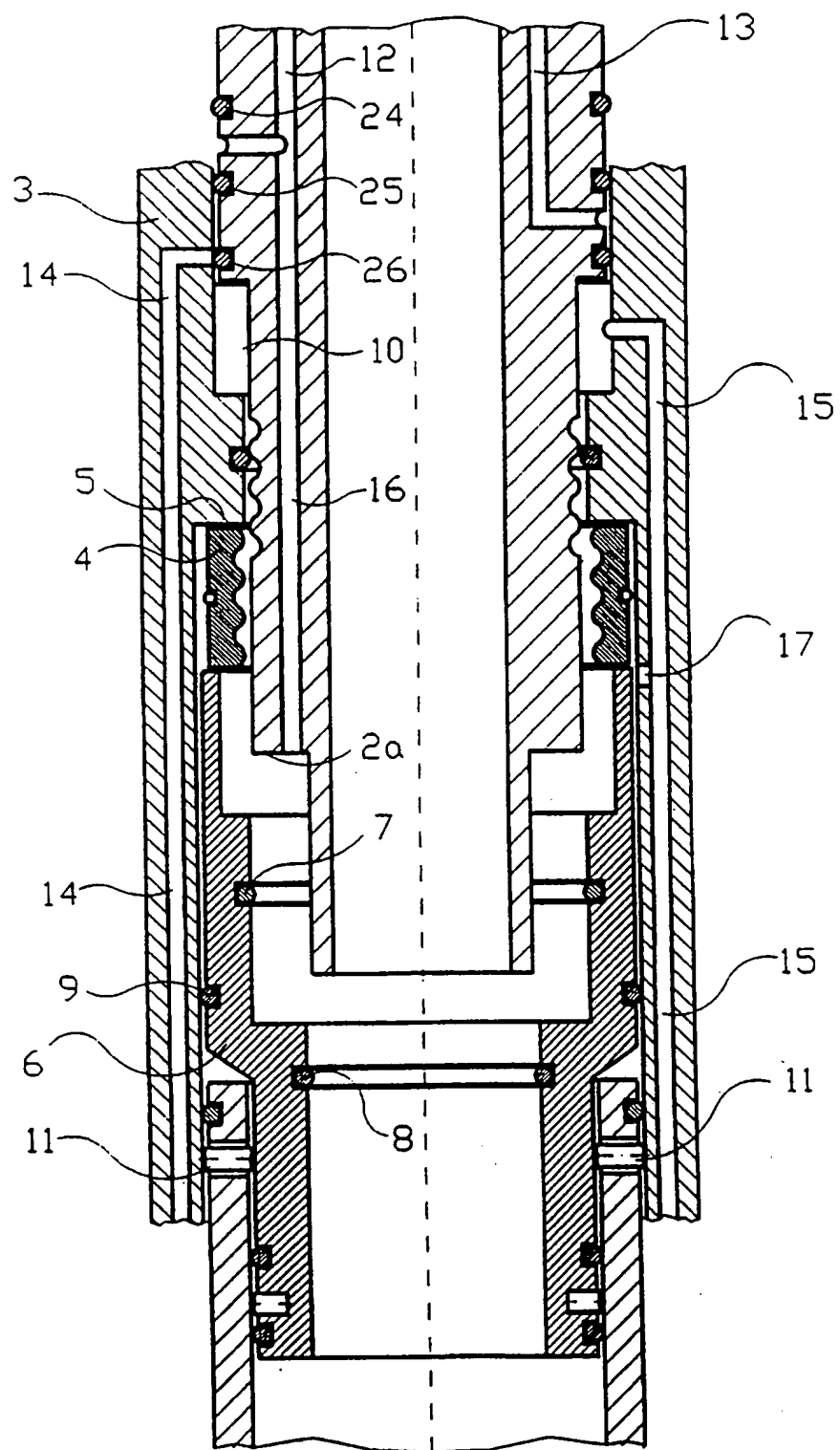


Fig. 3

INTERNATIONAL SEARCH REPORT
Information on patent family members

20/05/97

International application No.
PCT/NO 97/00035

Patent document cited in search report			Publication date		Patent family member(s)		Publication date	
US	5323853	A	28/06/94	CA	2119810	A	22/10/94	
				FR	2704274	A	28/10/94	
				GB	2278135	A,B	23/11/94	
				GB	2302111	A,B	08/01/97	
				GB	9405425	D	00/00/00	
				GB	9616938	D	00/00/00	
				NO	941337	A	24/10/94	

US	4526233	A	02/07/85	NONE				
